anujjindal.in

# CHAPTER- 2 AGRONOMY

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# Chapter 2 Agronomy

**The term "Agronomy" is derived from Greek words :**

1. "**Agros"** meaning field
2. **"nomos"** meaning to manage

**Agronomy is a branch of agricultural science which deals with principles and practices of soil, water and crop management**.

## Scope of Agronomy

| | |
|---|---|
| **It deals with:** | 1. The production of various crops which includes food crops, fodder crops, fibre crops, sugar, oilseeds, etc. The aim is to have better food production and to control the diseases. |
| | 2. The methods which provide favourable environment to the crop for higher productivity. |
| | 3. The areas of plant genetics, plant physiology, meteorology, and soil science. |
| | 4. The application of a combination of sciences like biology, chemistry, economics, ecology, earth science, and genetics. |

- Agronomy science becomes imperative in Agriculture in the following areas:

1 Proper methods of cultivation are needed to reduce the cost of cultivation and maximize the yield and economic returns.

2. Packages of practices to explore the full potential of new varieties of crops, are the most important aspects in crop production which could be made possible only by Agronomy science.

3. Keeping farm implements in good shape and utilizing in an efficient manner , is further broadening the scope of agronomy.

4. Maintaining the ecological balance through efficient management of crops, livestock and their feedings in a rational manner, is possible only by knowing agronomic principles.

5. Care and disposal of farm and animal products like milk and eggs and proper maintenance of accounts of all transactions concerning farm business is governing principles of agronomy.

6. Future agriculture depends on technologies for dry land agriculture which can be explored through Agronomy

7. Availability and application of chemical fertilizers has necessitated the generation of knowledge to reduce the ill-effects due to excess application and yield losses due to the unscientific manner of application.

8. Availability of herbicides for control of weeds has led to development of a vast knowledge about selectivity, time & method of its application.

9. Water management practices play greater role in present day crisis of water demand and Agronomy science answer to the questions ‘how much to apply?’ and ‘when to apply?’.

10. Intensive cropping is the need of the day and proper time and space intensification not only increase the production but also reduces the environmental hazards.

## Basic Principles of Agronomy

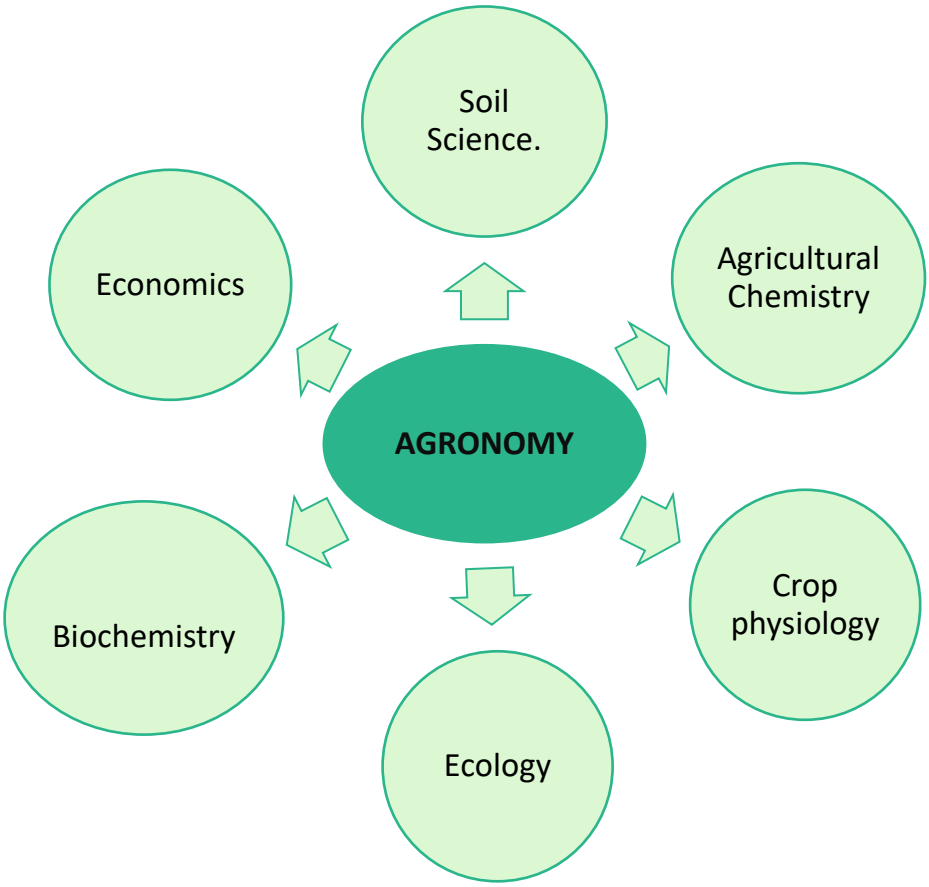
These are the following basic principles of agronomy:

- Planning, programming, and executing measures for maximum utilization of land, labour, capital, and other factors of production.

- Choice of crop varieties adaptable to the particular agro-climate, land situation, soil fertility, season, and method of cultivation and befitting to the cropping system.
- Proper field management by tillage, preparing field channels and bunds for irrigation and drainage, checking soil erosion, levelling, and adopting other suitable land improvement practices.
- Adoption of multiple cropping and also mixed or intercropping to ensure harvest even under adverse environmental conditions.
- Timely application of proper and balanced nutrients to the crop and improvement of soil fertility and productivity. Correction of ill-effects of soil reactions and conditions and increasing soil organic matter through the application of green manure, farmyard manure, organic wastes, biofertilizers, and profitable recycling of organic wastes.
- Choice of quality seed or seed material and maintenance of requisite plant density per unit area with healthy and uniform seedlings;
- Proper water management with respect to crop, soil and environment through conservation and utilization of soil moisture as well as by utilizing water that is available in excess, and scheduling irrigation at critical stages of crop growth.
- Adoption of adequate, need-based, timely, and exacting plant protection measures against weeds, insect-pests, pathogens, as well as climatic hazards and correction of deficiencies and disorders.
- Adoption of suitable and appropriate management practices including intercultural operations to get the maximum benefit from inputs dearer and difficult to get, low-monetary and non-monetary inputs.
- Adoption of suitable method and time of harvesting of the crop to reduce field loss and to release land for succeeding crop(s) and efficient utilization of residual moisture, plant nutrients, and other management practices

## Relation of Agronomy to other sciences

- Agronomy is a main branch of Agriculture. It is synthesis of several disciplines like soil science, Agricultural chemistry, crop physiology, plant ecology, biochemistry and economics.




## Soil Science

• helps the agronomist to thoroughly understand the soils physical, chemical and biological properties to effect modification of the soil environment .

## Crop Physiology

• helps to understand the basic life process of crops to understand functioning of each parts of plant to determine their input requirement like nutrients etc

**Agricultural Chemistry**

- help the agronomist to understand the chemical composition and changes involved in the production, protection, and use of crops and livestock

**Plant Ecology**

- helps to understand the associated environment in which the crops grown like the influence of weather (Temperature, Rainfall etc).

**Biochemistry**

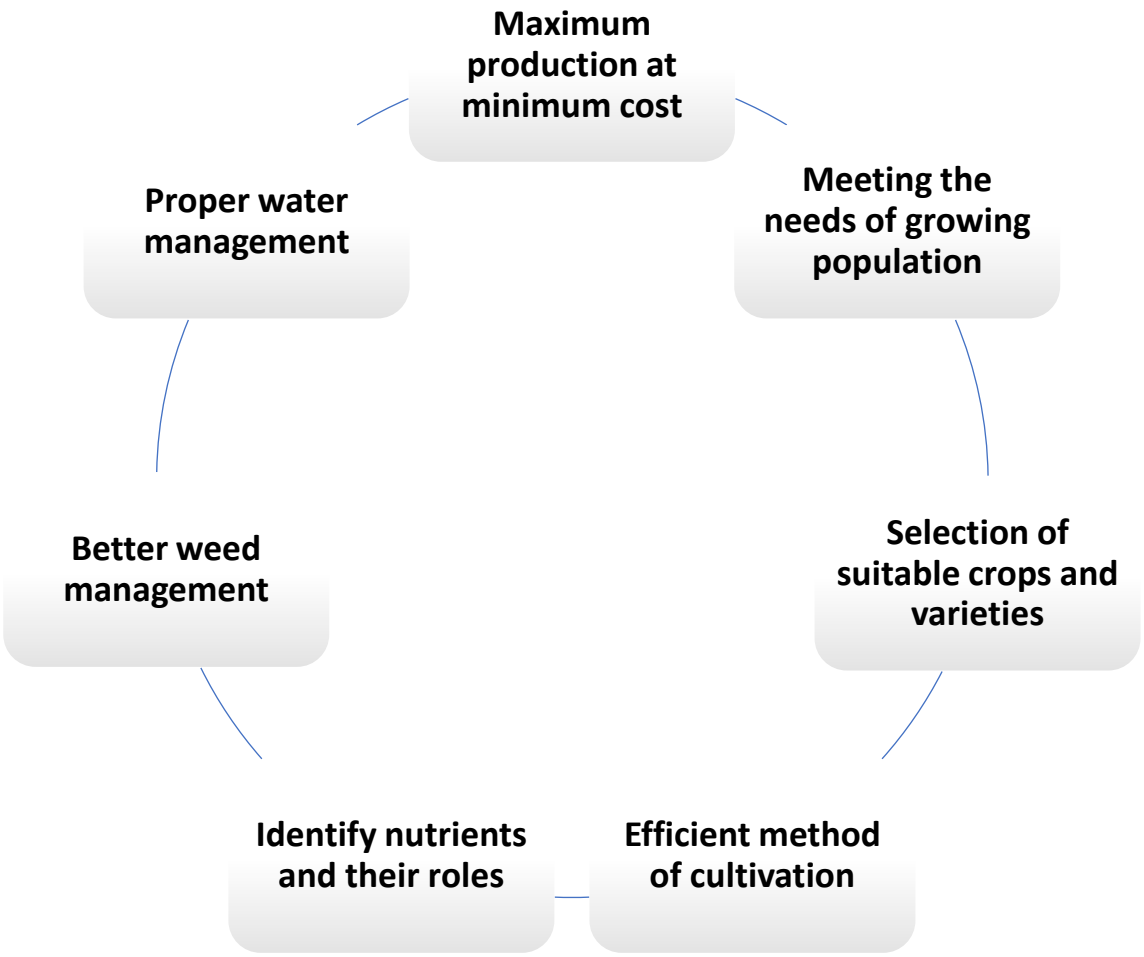
- shows the way in which biochemical process takes place in crops which helps to understand critical requirements to favourably activate this process

**Economics**

- paves the way for profit and loss analysis in farming

## Role of Agronomist

- "Agronomist is a scientist who is dealing with the study of problems of crop production and adopting/recommending practices of better field crop production and soil management to get high yield and income."
- The role of an Agronomist can be can be summarized in few points:


Maximum production at minimum cost
Meeting the needs of growing population
Selection of suitable crops and varieties
Efficient method of cultivation
Identify nutrients and their roles
Better weed management
Proper water management

- Agronomist aims at obtaining maximum production at minimum cost by exploiting the knowledge of the basic and applied sciences for higher crop production.
- In a broader sense, agronomist is concerned with production of food and fibre to meet the needs of growing population.
- He develops efficient and economic field preparation method for sowing crops in different season. (Flat bed, Ridges and furrows)
- Selection of suitable crop and varieties to suit varied seasons and soils. Eg. Red soil - groundnut, Black soil - cotton, Sandy soil – tuberous crops, Saline soil – Finger millet (Ragi). In Kharif if water is sufficient go for rice and water is not sufficient go for maize, sorghum.
- Evolves efficient method of cultivation (whether broadcasting, nursery and transplantation or dibbling, etc.) provides better crop establishment and maintain required population.
- He has to identify various types of nutrients required by crops including time and method of application. E.g. – Quantity of NPK

- Agronomist must select a better weed management practice. Either through mechanical or physical (by human work) or chemical (herbicides or weedicides)
- Selection of proper irrigation method, irrigation scheduling i.e. irrigation timing and quantity based on the crops to be irrigated, whether to irrigate continuously or stop in between and how much water to be supplied are computed by agronomy science so as to achieve maximum water use efficiency.

## Classification of Crop plants

Crop plants are grouped into three main classes according to the range of cultivation.

1. **Plantation Crops**
    - Crop plants that are grown on a larger scale on estates. They are perennial or permanent in nature. Examples: Tea estates, Coffee estates etc.,
2. **Field Crops**
    - Crop plants that are grown on a vast scale. They are mostly seasonal. Examples: Cotton, Cereal, Pulses etc., are field crops
3. **Garden Crops**
    - Crop plants that are grown on a small scale in gardens, exclusively for personal or household use and not for commercial purposes. Examples: Kitchen gardens, Flower gardens, and backyard gardens.

**The table below is factual in nature. You can understand the table better once you have completed the course. Therefore, it is advisable to understand the terms and then memorize the table.**

## 3. AGRONOMY

**Important points:**

| | | |
|---|---|---|
| ✓ | **Mycorrhiza** is a symbiotic association between: | **Fungus & roots of higher plants** |
| ✓ | VAM: *Vascular Arboscular Mycorrhyza* is used as: | **P solubilizing fungi in plant roots** |
| ✓ | Cereals are deficient in which amino acid: | **Lysine** |
| ✓ | Amino acid which is deficient in legumes: | **Methionine** |
| ✓ | Power tiller is most suitable for the cultivation of: | **Paddy** |
| ✓ | Ammonium polyphosphate contains: | **15% N & 62 % $P_2O_5$ (RPSC, AO-09)** |
| ✓ | **Tz** (tetrazolium) test is done for: | **Viability of seeds.** |
| ✓ | In wet nursery of rice, level of water is maintained: | **5 cm** |
| ✓ | The optimum depth of **puddling** in rice is: | **5 cm.** |
| ✓ | Ultra violet radiations are absorbed by: | **Ozone layer.** |
| ✓ | First Indian director of IARI was: | **Dr. B. Vishvanath.** |
| ✓ | The most critical stage of irrigation in wheat is: | **CRI stage** (21 days after sowing) |
| ✓ | **Jhuming** is a practice of rice cultivation in: | **Eastern part of India.** |
| ✓ | Basic objectof sustainable agriculture is: | **To maintain ecological balance** |
| ✓ | The plants growing in salt water are known as: | **Halophytes** |
| ✓ | Crop canopy temperature is measured by: | **Infra-red thermometer.** |
| ✓ | Reclamation disease is due to deficiency of: | **Copper** |
| ✓ | Hormone related to drought tolerance is: | **Abscisic acid (ABA)** |
| ✓ | Contribution of livestock in agriculture is | **29.7 %** |
| ✓ | Hormone used as an herbicide: | **2, 4-D, Dicamba** |
| ✓ | Element available in both anion and cation is: | **Nitrogen** *(IARI, Ph.D-11)* |
| ✓ | Dormancy breaking hormone is: | **Gibrellic acid** |
| ✓ | Ring worm disease is caused by: | **Fungus.** |
| ✓ | Monsoon is responsible to cause rainfall in Tamil Nadu: | **North East monsoon** |
| ✓ | Stress hardening in plants can be achieved by: | **ABA.** |

| | | |
|---|---|---|
| ✓ | Maximum permissible limit of biuret in urea is | **1.5%.** |
| ✓ | Carbon content in organic matter: | **58 %.** |
| ✓ | Bio fertilizer used in wheat is: | **Azatobacter.** |
| ✓ | Bio fertilizer used in sorghum and grasses is | **Azospirillum** |
| ✓ | Vertical mulch is used in which type of soils | **Black cotton soils.** |
| ✓ | Criteria of essentiality were given by: | **Arnon & Stout, 1939.** |
| ✓ | The optimum spacing for wheat is: | **22.5 cm** (line to line) |
| ✓ | The nontraditional area for cultivating wheat is: | **Eastern India.** |
| ✓ | Major P fertilizer commonly used in India is: | **DAP.** |
| ✓ | State having minimum BPLpopulation is: | **Punjab.** |
| ✓ | Maximum number of BPL peoples are in: | **Bihar** |
| ✓ | Bio fertilizer more suited for sugarcane is: | **Azatobacter** |
| ✓ | Depth of sowing of soybean seed: | **3 cm.** |
| ✓ | First variety of rice introduced in India is: | **TN-1 (1964-65)** |
| ✓ | Indian mustard is known as: | ***Brassica juncea.*** |
| ✓ | Explosive fertilizer is: | **Ammonium nitrate.** |
| ✓ | Most prominent soil group of India: | **Alluvial soil.** |
| ✓ | In SSP sulphur contains: | **12 %.** |
| ✓ | Which micro nutrient deficient in Indian soils: | **Zn.** |
| ✓ | Which macro nutrient mostly deficient in Indian soils | **Nitrogen** |
| ✓ | **Spike tooth** harrow is a type of implement: | **Secondary tillage** |
| ✓ | Most widely used material for correcting soil acidity is: | **Lime.** |
| ✓ | **Diara** cultivation method is followed in: | **Cucurbits.** |
| ✓ | **C: N** ratio of organic matter is: | **10:1** |
| ✓ | National Seed Act was passed in: | **1966.** |
| ✓ | National Seed Corporation (NSC) in: | **1963.** |
| ✓ | Root promoting hormones: | **IBA** |
| ✓ | Flower and fruit setting hormone: | **NAA** |
| ✓ | Bench terracing is done when slope is more than: | **15 % (16-33%)** |
| ✓ | Mass per unit volume is called: | **Bulk density.** |
| ✓ | Disk plough is used when the soil is: | **Tough.** |
| ✓ | First man made cereal is: | **Triticale.** |
| ✓ | Cheapest N contains fertilizer is: | **Urea.** |
| ✓ | First product of urea hydrolysis: | **Ammonium** |

| | | |
|---|---|---|
| | | carbamate. |
| ✓ | NABARD was set up on the recommendation of: | Sivaramman committee |
| ✓ | Free living nitrogen fixing organism is: | Azatobacter |
| ✓ | The fruit of mustard is known as: | Siliqua. |
| ✓ | Supplemental irrigation is known as: | Life saving irrigation |
| ✓ | Major agricultural importing commodity in India is: | Edible oil (65%) |
| ✓ | Lunishree is a variety of: | Super rice. |
| ✓ | Plants with separate male and female flower on same plant are known as: | Monoecious |
| ✓ | National biodiversity board is situated at: | New Delhi. |
| ✓ | *Beaufort scale* is used to measure: | Wind force/speed |
| ✓ | One standard atmosphere is equal to | 1013.25mb |
| ✓ | Die back of shoots occur due to deficiency of: | Copper |
| ✓ | Occurrence of grey spots on leaves is due to deficiency of: | Manganese (Mn). |
| ✓ | Most destructive disease of sugarcane is: | Red rot of sugarcane. |
| ✓ | Potatoes are borne on: | Stolon |
| ✓ | Potato tubers are a modified form of: | Stem |
| ✓ | Sowing of sugarcane in trench method is helpful to prevent: | Lodging |
| ✓ | For seed purpose carrot is grown as: | Biennial |
| ✓ | Boron is harmful to plants when concentration is: | More than 3 ppm |
| ✓ | Which crop has maximum productivity among the cereals: | Maize |
| ✓ | **Kaolin** is a type of anti-Transpirants: | Reflecting type |
| ✓ | Cycocel (CCC) is a: | Growth retardants |
| ✓ | Family of sesame: | Pedaliaceae |
| ✓ | Family of jute: | Tilliaceae |
| ✓ | Exhaustive family of crops is: | Graminae (poaceae) |
| ✓ | Origin of maize: | Mexico |
| ✓ | Origin of soybean: | China |
| ✓ | Origin of tobacco: | Mexico |
| ✓ | State having highest area under summer maize is: | Bihar |

| | |
|---|---|
| Indian Journal of Agriculture Sciences is published by: | **ICAR** |
| Yellowing of tea leaves may be due to the deficiency of: | **Sulphur** |
| The greenhouse gas that released from paddy field is: | **Methane** |
| The edible part of sweet potato (*Ipomoea batata*) is: | **Adventitious root** |
| Carbon dating technique is used to determine age of: | **Fossils** |
| The irrigation method which is suitable for saline soils is: | **Flooding method** |
| Element contributing to the disease & drought resistance is: | **Potassium** |
| Element involved in energy transfer and storage in plants is: | **Phosphorus** |
| At present how many nutrients are termed as essential elements for plants: | **17 nutrients** |
| According to Arnon & Stout how many nutrients are termed as essential elements for plants: | **16 nutrients** |
| Apical bud dominance is caused by due to: | **Auxin hormone** |
| Highest consumption of k fertilizer in: | **Maharashtra** |
| Highest production of cereal crop in world is | **Wheat** |
| Seed rate of sorghum is: | **9-12 kg/ha** |
| Dc suckering is a important practice of : | **Tobacco.** |
| Name the weed, which was first biological controlled: | ***Lantana camera*** |
| State, where seed law are adopted: | **Karnataka** |
| Soil moisture tension directly measured by: | **Tensiometer** |
| Evapo-transpiration measured by: | **Lysimeter** |
| Parshall flame is used for measurement of: | **Water flow** |
| Flood irrigation method is suitable in the crop: | **Rice & jute** |
| Fertilizer application through irrigation is known as: | **Fertigation** |
| One of the most important cultural practice in rice field is: | **Puddling** |
| Post-harvest losses in cereals accounts for: | **10%** |

| | | |
|---|---|---|
| ✓ | Saltation is a process of: | **Wind erosion** |
| ✓ | Irrigation efficiency of loamy soils: | **70% (highest)** |
| ✓ | Sowing pattern used in dry land is: | **Broadcasting** |
| ✓ | Most efficient method of irrigation is: | **Drip irrigation** |
| ✓ | Extensively grown pulse crop in India is: | **Chick pea** |
| ✓ | Relative humidity measured by: | **Psychrometer** |
| ✓ | Crops growing for conservation of soil moisture is known as: | **Mulch crops** |
| ✓ | Example of erosion permitting crop is: | **Maize** |
| ✓ | Example of erosion resistant crops are: | **Cow pea, Groundnut** |
| ✓ | The herbicide used as pre-plant incorporation (PPI) is: | **Fluchloralin** |
| ✓ | Example of $C_3$ weed is: | **Bathua** (lamsquarter) |
| ✓ | The botanical name of **two rowed** barley is: | ***Hordeum distichon*** |
| ✓ | The name of **six rowed barley** is: | ***Hordeum vulgare*** |
| ✓ | In which crop first**AICRP** was started | **Maize (1957)** |
| ✓ | What is the optimum plant population for **Bt-cotton:** | **10,000 plants/ha** |
| ✓ | **Dropsy** disease in human being is caused by the weed: | ***Argemone mexicana*** (Satyanasi) |
| ✓ | Crop is suitable for soil having $P^H$ 4-6: | **Rice, tea and potato** |
| ✓ | Red hemoglobin in root nodules is responsible for: | **Transport of $O_2$** |
| ✓ | Annual rainfall in Rajasthan is about: | **500-575 mm** |
| ✓ | Aminophilic plants: | **Sugarcane and rice** |
| ✓ | Country having 100% of the cropped area under irrigation: | **Egypt** |
| ✓ | Country having highest irrigation efficiency: | **Israel** |
| ✓ | Country having highest irrigated area: | **India** |
| ✓ | Optical wave lengths in **remote sensing ranges:** | **0.3 to 15 um** |
| ✓ | India is the **first** country to develop and use of hybrids in bajra, and the first variety was: | **HB-1(1965)** |
| ✓ | In India which crop is having maximum area under irrigation: | **Wheat** |
| ✓ | Most extensively grown fruit crop in the world is: | **Mango** |

| | | |
|---|---|---|
| ✓ | **Pusa giant** is the variety of: | **Berseem, Napier grass& Papaya** |
| ✓ | Type of soil water which is most useful for plants is: | **Capillary water.** |
| ✓ | At **equator** day and nights are always: | **Equal.** |
| ✓ | Atmospheric pressure always **decreases** with: | **Altitude.** |
| ✓ | **Horizontal** heat transfersfrom warmer area to cooler area, the effect is known as: | **Cloth lineeffect** |
| ✓ | In which effect **vertical** heat transfers from warmer to cooler crop area: | **Oasiseffect** |
| ✓ | The enzyme of **nitrogen reduction** is: | **Nitrogenase** |
| ✓ | The element of **nitrate reduction** is the: | **Molybdenum.** |
| ✓ | Most of field crops require the pH range for optimum growth is: | **6.5-7.0** |
| ✓ | Hence; cultivated mostly crops are: | **Acidic in nature(IFFCO Exam- 09)** |
| ✓ | Depth of water required by a crop is known as: | **Delta** |
| ✓ | Area irrigated by one cusec discharge of water is: | **Duty** |
| ✓ | Period in days for which irrigation is supplied to a crop is: | **Base period** |
| ✓ | Rancidity in sunflower oil is due to: | **Oxidation.** |
| ✓ | Varieties of black gram are: | **T-9, Pant U-19** |
| ✓ | Famous variety of moth bean is: | **RMO-40, RMO-257** |
| ✓ | Elite varieties of moong bean are: | **Pusa baisakhi, SML-668** |
| ✓ | **0.1%** solution in **500 liters** of water is: | **500 ml(RPSC, AO-09/SRF-09)** |
| ✓ | **Bioclimatic** low was proposed by: | **Hopkins** |
| ✓ | Chemical safeners are also known as **herbicide antidote** e.g. | **NA (it usedfirst in maize)** |
| ✓ | **Crop** which has **highest** $K^+$ up take: | **Potato** |
| ✓ | The low pressure area near the equator is called: | **Doldrums/ITCZ** |
| ✓ | **Triacontanol** is a growth stimulant obtains from: | **Leaves of Lucerne** |

✓ **Tillage increases the water holding capacity** and **infiltration** of soil but it **reduces** bulk density.

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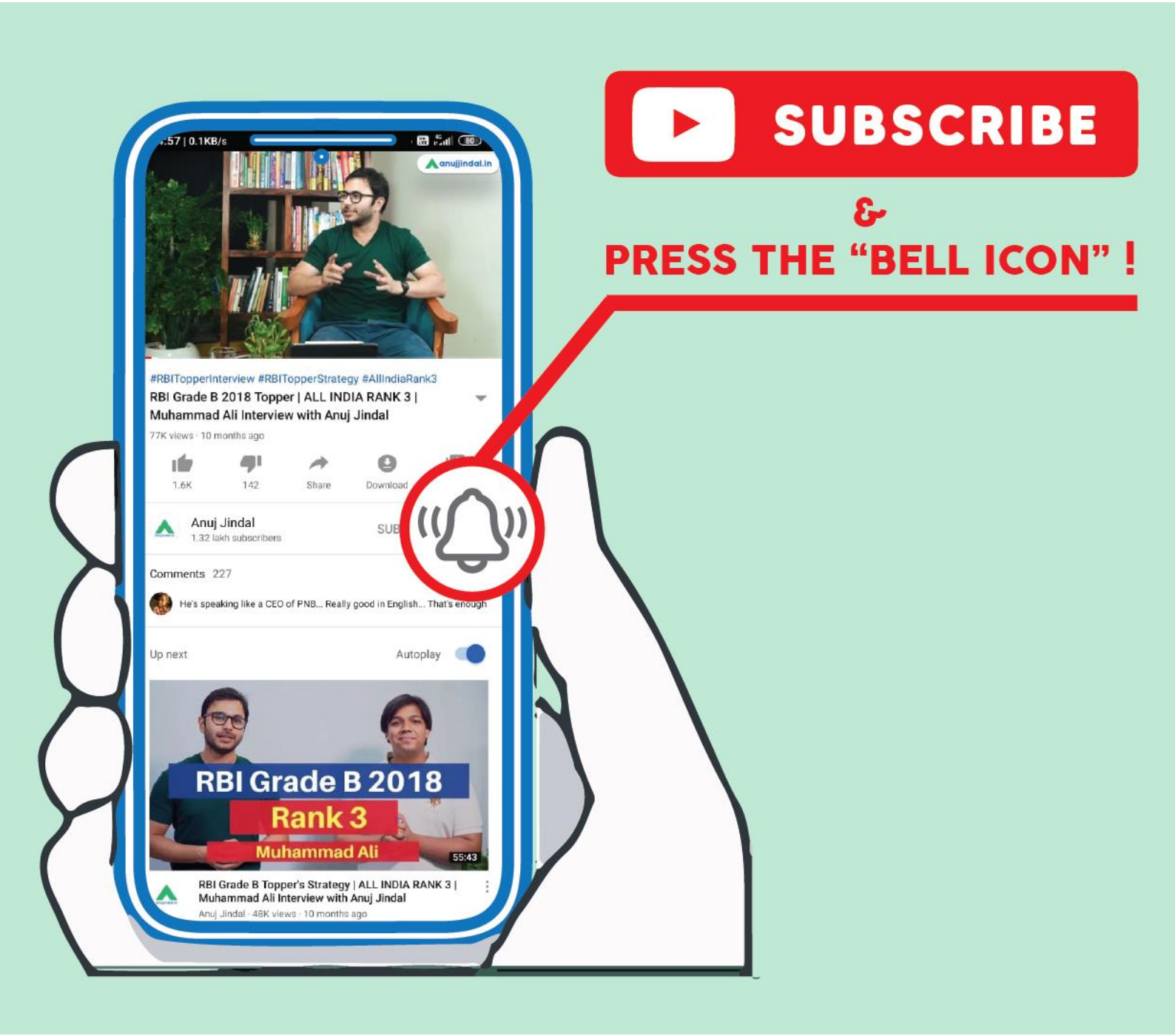
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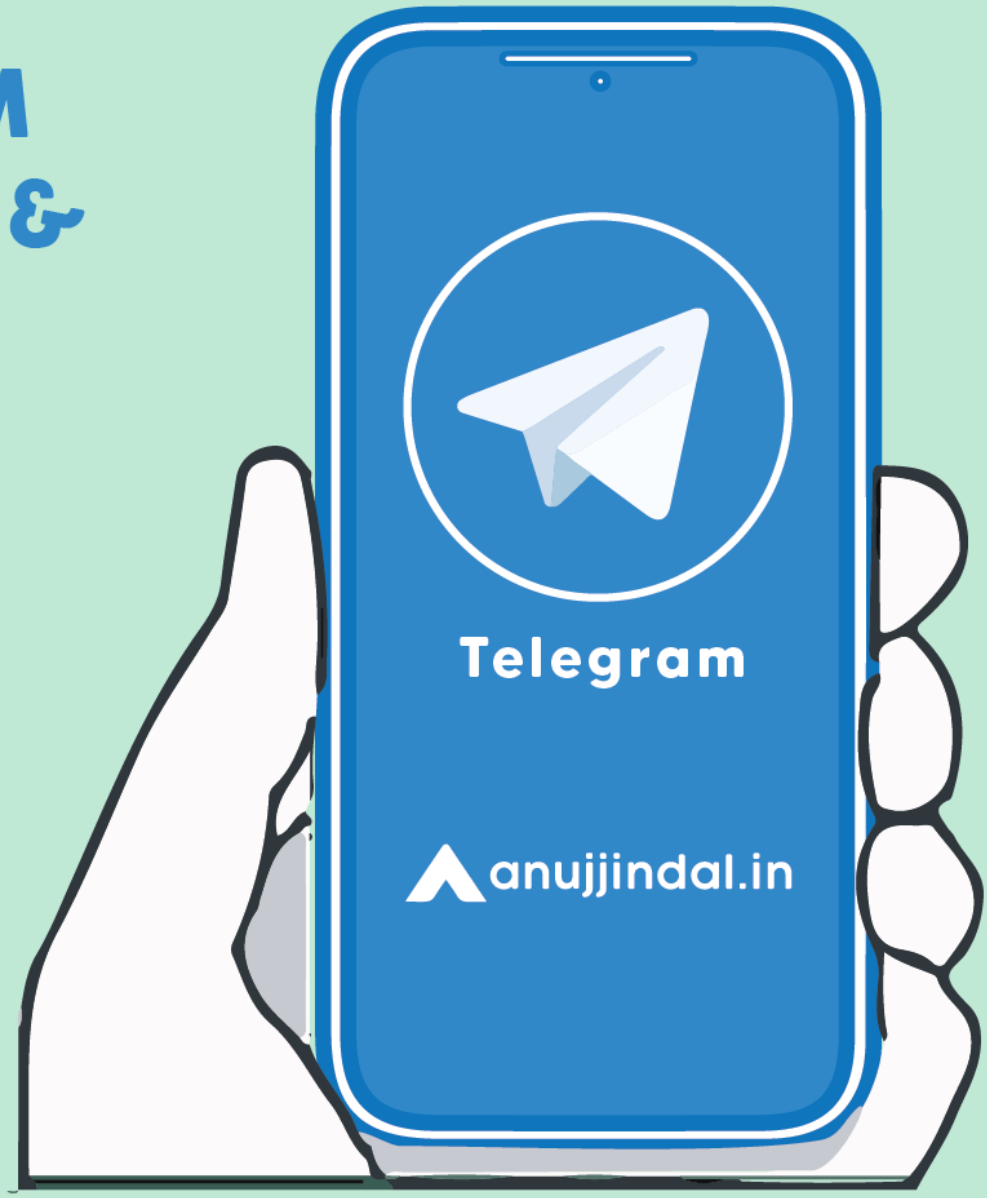

# HALL OF FAME

**All Indian Rank 01**
Rajendran S
**SEBI**

**All India Rank 03**
Ali
**RBI**

**All India Rank 06**
Aditya Sood
**RBI**

**All India Rank 10**
Sameer
**RBI**

**All India Rank 11**
Abhishek
**RBI**

**Cleared RBI Grade B**
Sanskar Vijay

**Cleared RBI Grade B**
Sanjay Meena

**Cleared RBI Grade B**
Yash Gupta

**Cleared RBI Grade B**
Ila Sahu

**Cleared RBI Grade B**
Argha Banerjee

**Cleared RBI Grade B**
Suchana Ghosh

**Cleared NABARD**
Vinay Verma

**Cleared NABARD**
Lal Chand Kumar

**Cleared NABARD**
Krishna Kumar Singh

**Cleared NABARD**
Anshu Goel

**Cleared NABARD**
Jatin Kumar

**Cleared NABARD**
Atul Yadav

**Cleared SEBI**
Abhishek Kumar

**Cleared SEBI**
Vishwanidh Singh

**Cleared SEBI**
Gopika Jayan

**Cleared SEBI**
Vasant Kesari

**Cleared SEBI**
Swetha Bodagala

**NET with 98 Percentile**
Anushka Keshri

**JRF with 96.92 Percentile**
Vaishali Jadon

**NET with 89.27 Percentile**
Srishti Gupta

**JRF with 72 Percentage**
Abhishek Mohanty

**NET with 68 Percentage**
Dinesh Mohan

**JRF with 64.66 Percentage**
Adhwaresh Pandey

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